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A REVISION OF THE *METAPHIDIPPUS ARIZONENSIS* GROUP (ARANEAE, SALTICIDAE)

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ABSTRACT

The *Metaphidippus arizonensis* group contains two species, *Metaphidippus arizonensis* (Peckham and Peckham) and *M. helenae* (Banks). The two species share similar genitalic morphology. *M. arizonensis* occurs in both tall and shortgrass habitats in the central grasslands from southern Alberta to eastern Minnesota south to Arizona and New Mexico. *M. helenae* occurs in the interior basins of North Dakota, Utah, and Wyoming, and in saline marshlands of central California. Both species are redescribed and *M. glacialis* (Scheffer) is synonymized with *M. arizonensis.*

INTRODUCTION

During the 1970's we were independently engaged in biological studies of *Metaphidippus arizonensis* (Peckham and Peckham) at the southern and northern ends of its range (these studies to be published separately). It became apparent that there was some confusion in the taxonomy of the species, particularly concerning the status of *M. glacialis* (Scheffer). As a result, we decided to determine if indeed two species were represented. In a search for similar species we found that only one other North American species is closely related, *M. helenae* (Banks). It has been suggested that *M. tillandsiae* Kaston may belong in this species group, but the genitalia are of a different type. This small species group bears epigynal resemblances to two Siberian and Mongolian species described by Prozynski (1979). He noted an external epigynal similarity to *M. glacialis* in his *Dendryphantes biankii,* but internally they are different. However, the internal epigynal structure of his *D. czekanowskii* bears a close resemblance to the internal epigynal structures seen in the *M. arizonensis* group. Both of these Palearctic species are represented by only three female specimens; if males become available, they would be of considerable interest.

METHODS

Certain measurements for statistical purposes were standardized. These were all done on field collected females, males being relatively rarer in collections. Three populations of *M. arizonensis* were tabulated separately. Fewer specimens of *M. helenae* were available, so these measurements were pooled. All measurements throughout this paper are in millimeters.

SYSTEMATICS

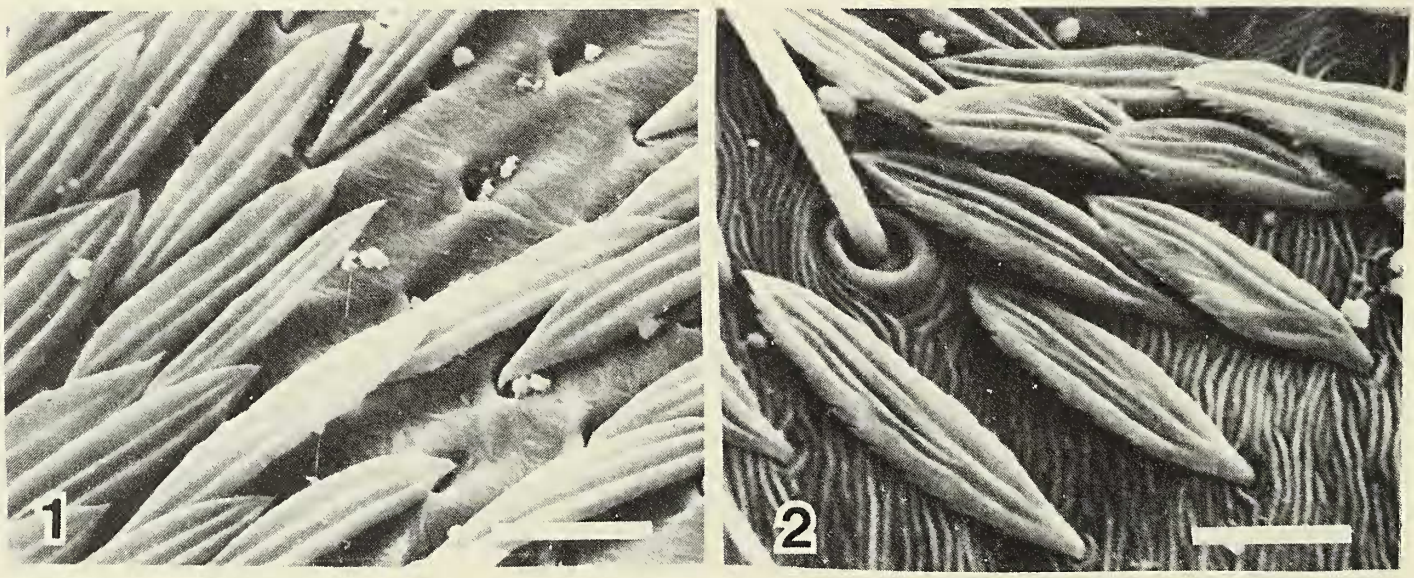
Metaphidippus F. O. P. - Cambridge 1901.
Metaphidippus arizonensis group.

This small group may be readily distinguished from other *Metaphidippus* by genitalic characters. Males have a retrolateral palpal tibial apophysis which bifurcates near the tip forming a small hook. This is an oddity in North American members of the genus, the others have the tibial apophysis simple. The unexpanded bulb of the palpus is large compared to the cymbium. Females have a large external epigynum, which has a peculiar general appearance, resembling that of an insect face (Figs. 8 and 16). The internal genitalia are simple consisting of spermathecae with a loop (Figs. 9-11 and 17). Scale ultrastructure as viewed by scanning electron microscopy (Figs. 1 and 2) exhibits the predominantly three shafted morphology typical of "dendryphantine" salticids (Cutler 1981, Hill 1979).

KEY TO SPECIES

1. Males 2
   Females 3

2. Embolus in ventral view broadly spatulate, tip not twisted and acuminate . . . . . *helenae*
   Embolus in ventral view not broadly spatulate, tip twisted and acuminate . . . . . *arizonensis*



Figs. 1-2.–*Metaphidippus arizonensis,* Cedar Creek male: 1, scales between row III eyes; 2, opisthosoma, lateral. Both markers = 25 μm.

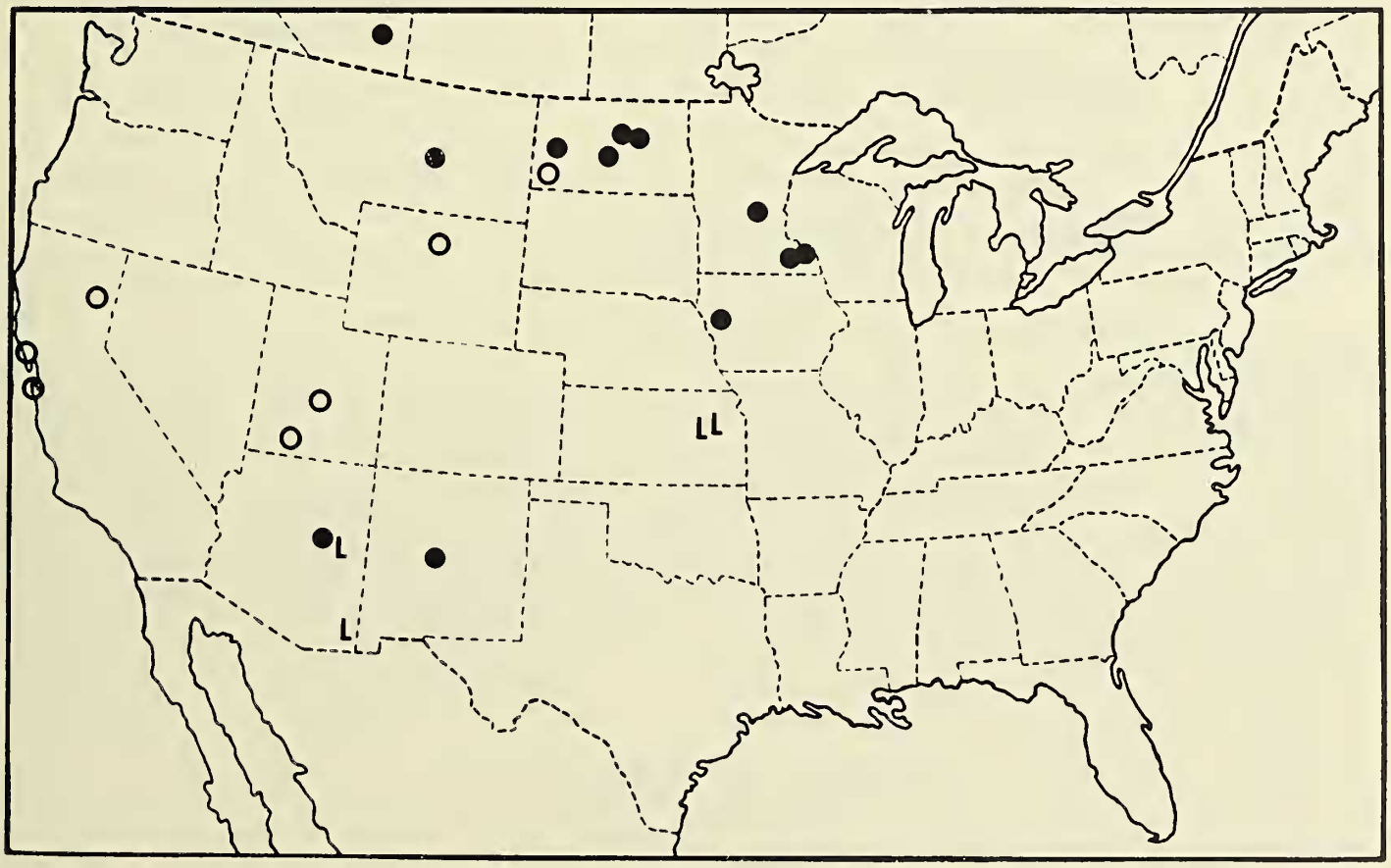
3. External epigynum with sclerotized rims of openings perpendicular to the long axis of the opisthosoma (Fig. 16); interior epigynum with loop of spermathecae posterior to epigynal openings (Fig. 17) . . . . . *helenae*
   External epigynum with sclerotized rims of openings parallel to the long axis of the opisthosoma (Fig. 8); interior epigynum with loop of spermathecae at level of epigynal openings (Figs. 9-11) . . . . . *arizonensis*

Metaphidippus arizonensis (Peckham and Peckham)
Figs. 1-11, Map 1

Dendryphantes arizonensis Peckham and Peckham 1901:326, pl. 28, f. 2, 1909:463, pl. 36, f. 7.
Metaphidippus arizonensis: Petrunkevitch 1911:622.
Dendryphantes glacialis Scheffer 1905:7, 1906:124, f. 3, 4, 8; Peckham and Peckham 1909:463, pl. 37, f. 7. **NEW SYNONYMY.**
Metaphidippus glacialis: Bonnet 1957:2814.

Notes.–The Peckham's type was compared by Dr. H. W. Levi, and agrees with the other specimens discussed here; it is a male from an unknown locality in Arizona. Scheffer's specimens are unavailable or lost; letters to Kansas brought no response, and the specimens are not at the AMNH, CAS, MCZ, or the U.S. National Museum. [Apparently Scheffer described a number of species in 1905 in the Industrialist. These descriptions were repeated (as new) the next year in the Transactions of the Kansas Academy of Sciences. The latter publication is much more readily available in libraries, and contains illustrations not in the original description.]

Male (Arizona, Chevelon Ranger District).–Total length 4.6, carapace 2.22 long, 1.67 wide. Eyerow I width 1.18, eyerow III width 1.19, eyefield length 0.89. Eye diameters:



Map 1.–Ranges of *Metaphidippus arizonensis* (closed circles = examined specimens, L = literature records) and *M. helenae* (open circles).

Table 1.–Analysis of variation in populations of *M. arizonensis*. Femur = length of femur I, epigynum = minimum distance between sclerotized rims of epigynum, carapace = width of eyerow III. Column means followed by the same letter are not significantly different, one-way ANOVA, $P \leqslant 0.05$.

		FEMUR		EPIGYNUM		CARAPACE	
Population	n	$\bar{X}$±S.D.	Range	$\bar{X}$±S.D.	Range	$\bar{X}$ ±S.D.	Range
Cedar Creek	35	1.23±0.08[a]	1.04-1.42	0.19±0.02[a]	0.13-0.23	1.23±0.07[a]	1.13-1.40
Kellogg	12	1.39±0.08[b]	1.18-1.48	0.20±0.02[a]	0.15-0.23	1.34±0.10[b]	1.12-1.42
Chevelon	31	1.26±0.08[a]	1.09-1.50	0.18±0.02[a]	0.12-0.23	1.25±0.07[a]	1.07-1.50

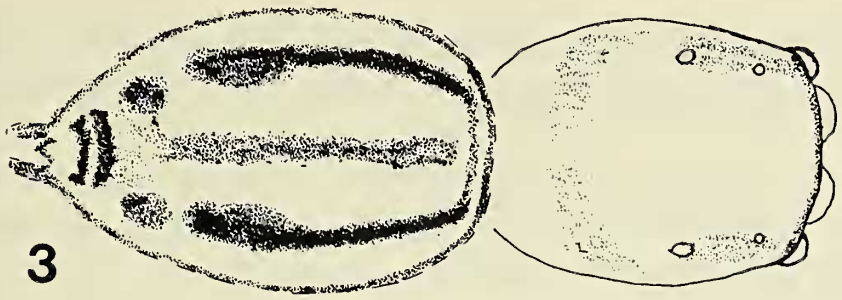
AME 0.28, ALE 0.17, PME 0.06, PLE 0.14. Distance ALE-PME 0.24, PLE-PME 0.30. Femora lengths I 1.37, II 1.14, III 1.08, IV 1.31. Leg formula I, IV, II, III. Spines Leg I, dorsal femoral 5, tibia 3-3, metatarsus 2-2. Color pattern see figure 3.

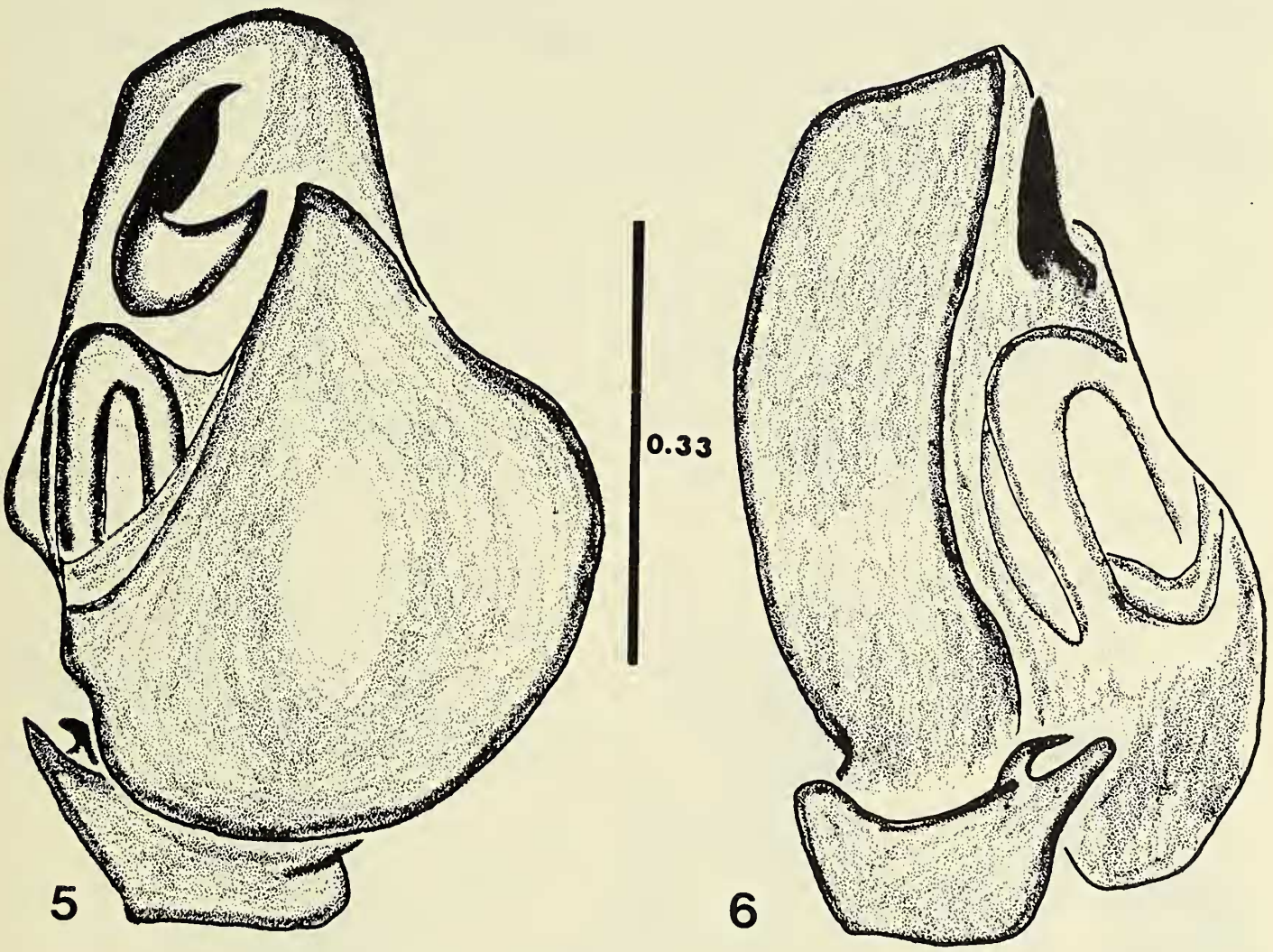
Female (Arizona, Chevelon Ranger District).–Total length 5.7, carapace 2.41 long, 1.81 wide. Eyerow I width 1.27, eyerow III width 1.29, eyefield length 0.95. Eye diameters: AME 0.27, ALE 0.16, PME 0.07, PLE 0.15. Distance ALE-PME 0.25, PLE-PME 0.32. Femora lengths I 1.34, II 1.12, III 1.09, IV 1.40. Leg formula IV, I, II, III. Spines as in male. Color pattern see figure 7.

Three populations of females were chosen for numerical comparison. Two were from Minnesota, Allison Savanna – Cedar Creek, Anoka Co. (these sites are adjacent, separated only by a county road) and Kellogg, Wabasha Co.; and, one from Arizona, Chevelon Ranger District, Coconino Co. Three measurements were obtained from specimens: from the carapace, the width of eyerow III; from an appendage, the length of right femur I; from the opisthosoma, the narrowest point between the sclerotized rims of the epigynum. Table I summarizes the data. Note that one of the Minnesota populations resembles the Arizona population, whereas the other Minnesota population had members that were significantly larger. Chi-square tests for independence of characters within populations were nonsignificant. In addition to the identity in genitalic morphology, it appears that morphometrically there are no great differences in northern and southern populations of this species, other than local population differences.

Distribution.–From Alberta through Montana and North Dakota to southeast Minnesota, south through Kansas to New Mexico and Arizona. Does not occur west of the Rocky Mountains.

Material examined.–CANADA: **Alberta,** Medicine Hat (Carr), female (AMNH). UNITED STATES: **Arizona;** *Coconino Co.*, Sitgreaves National Forest, T13N, R13E, sections 17-20, 30, 35, west of Bart's Crossing (7000 feet) summer months 1969 to 1973, on forbs and seedling pine trees (D. T. Jennings), one male, numerous females (AMNH); **Iowa;** *Woodbury Co.*, four miles ENE of Hornick, 14 June 1970, sweeping upland prairie on bluff (B. Cutler), female (FSCA); **Minnesota;** *Anoka Co.*, Helen Allison Savanna, Nature Conservancy Area, E. of E. Bethel, April to October 1978 to 1980, on forbs in and sweeping sand prairie (B. Cutler), numerous males and females (AMNH and BC); *Anoka and Isanti Cos.*, Cedar Creek Natural History Area, E. of E. Bethel, April to October late 1970's to 1981, on forbs in and sweeping sand prairie (B. Cutler), numerous males and females (BC); *Wabasha Co.*, 3 miles SE of Kellogg, spring and summer months from 1974 to 1978, sweeping sand prairie (B. Cutler and R. Huber), 3 males, numerous females (BC); *Winona Co.*, Whitewater Game Refuge 1 mile E. of Beaver, 31 July 1982, in retreats on heads of *Lespedeza* (B. Cutler), numerous females (BC); **Montana;** *Petroleum Co.*, 1.5 miles S., 5 miles W. of Winnett, May 1971, sweeping disturbed short grass plains (N. E. Rees), male, female (BC); **New Mexico;** *Socorro Co.*, 21 miles E. of San Antonio, 28 June 1975, on roadside table in desert grassland (R. Carter), male (BC); **North Dakota;** *McHenry Co.*, Denbigh Sand Dune Reserve, 27 June 1970, on brush (P. D. Tobin), female (FSCA); 14 miles SW of Towner,





Figs. 3-6.–*Metaphidippus arizonensis* males: 3, Chevelon specimen, dorsal view; 4, Cedar Creek specimen, apical view of palpal tibia after removal of tarsus; 5, Chevelon specimen, ventral view of palpus; 6, Cedar Creek specimen, retrolateral view. Scale line in mm does not pertain to dorsal body view.

15 June 1971, brushing grass (P. D. Tobin), female (FSCA); *McLean Co.*, Garrison, near Douglas Creek Bay, 4 July 1970, on weeds (P. D. Tobin), male (FSCA); *Williams Co.*, Williston, 13 June 1973, male on plant in field, females in nests in dry plants in field (D. Maddison), male, three females (WM).

In addition, the following literature records are believed to be reliable: Scheffer's specimens were from **Kansas:** Pottawatomie Co., St. George, and Riley Co., Manhattan; Jung and Roth (1974) **Arizona:** *Cochise Co.*, Chiracahua Mountains; Jennings (1973) *Coconino Co.*, Sitgreaves National Forest, Chevelon Ranger District, Dudley Burn, sec. 20, T13N, R14E (7100 feet), 24 July 1970, female and egg retreat in dead stem of *Tragopogon pratensis* L. (AMNH). Although Worley and Pickwell (1927) have been listed as recording this species (as *D. glacialis*) from Nebraska, they only noted that it was possibly present.

Metaphidippus helenae (Banks)

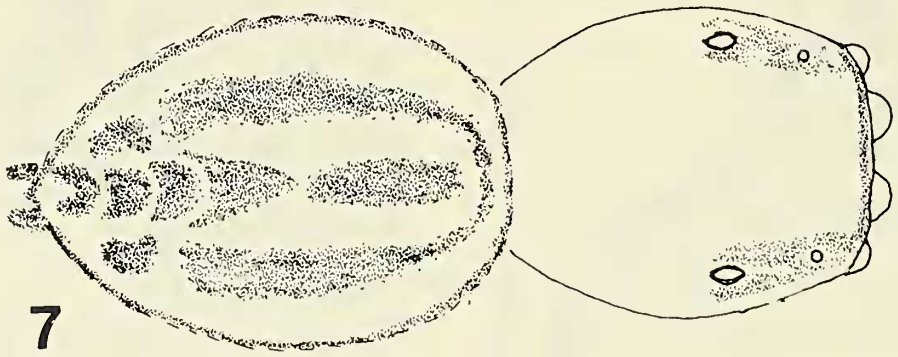
Figs. 12-17, Map 1

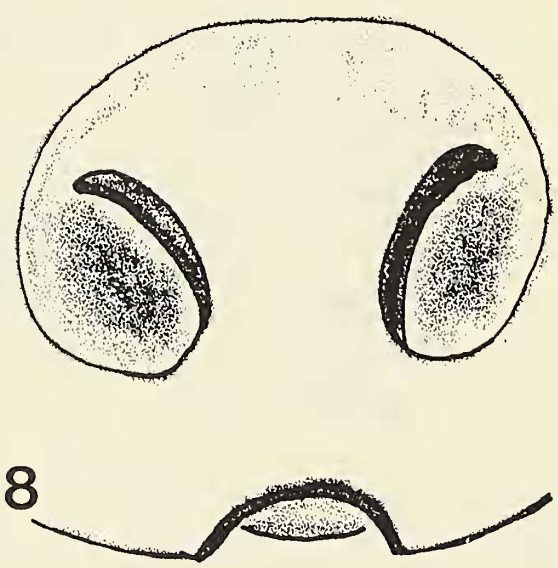
Dendryphantes helenae (Banks) 1921:101-102, f. 5.
Metaphidippus helenae: Gertsch 1934:18.
Dendryphantes sausalitanus Chamberlin 1925:137, f. 57-58, Gertsch 1934:18 (synonymy with *M. helenae*).

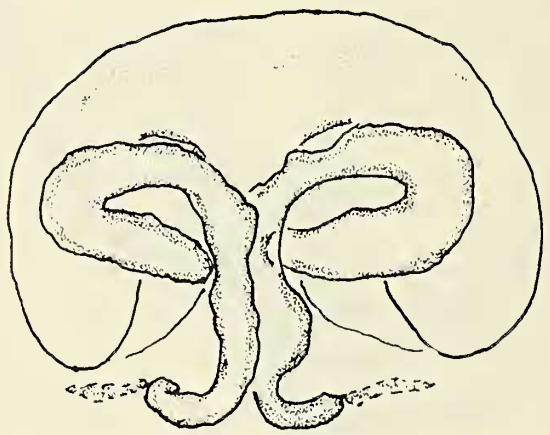
Notes.—In the vial with the two female paratypes in the MCZ is a left palpus of a male, this is probably the left palpus of the holotype which is missing from that specimen.

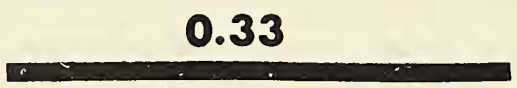
Male holotype.—Total length 4.3, carapace 1.85 long, 1.42 wide. Eyerow I width 1.00, eyerow III width 1.00, eyefield length 0.73. Eye diameters: AME 0.28, ALE 0.18, PME 0.07, PLE 0.15. Distance ALE-PME 0.18, PLE-PME 0.23. Femora lengths: I 1.19, II 0.97, III 0.92, IV 1.15. Leg formula I, IV, II, III. Spines, leg I dorsal femoral 4, tibia 3-3, metatarsus 2-2. Range of total length in five males 3.4-4.4. Color pattern faded in this specimen, see Figure 12 for unfaded appearance.

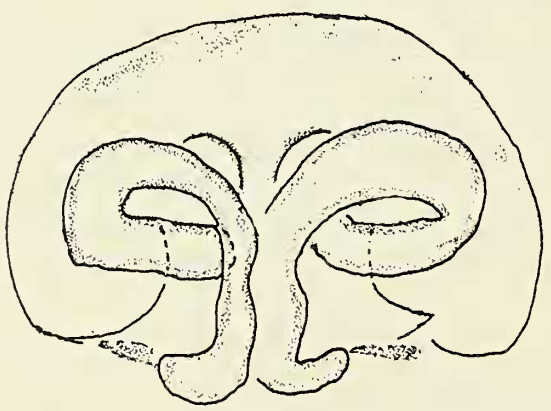
Female (paratype in CAS).—Total length 5.2, carapace 2.01 long, 1.54 wide. Eyerow I width 1.16, eyerow III width 1.15, eyefield length 0.95. Eye diameters: AME 0.30, ALE

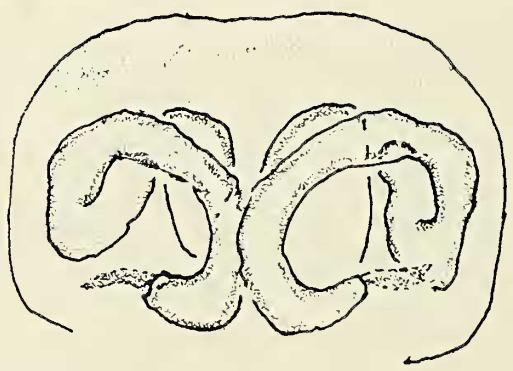












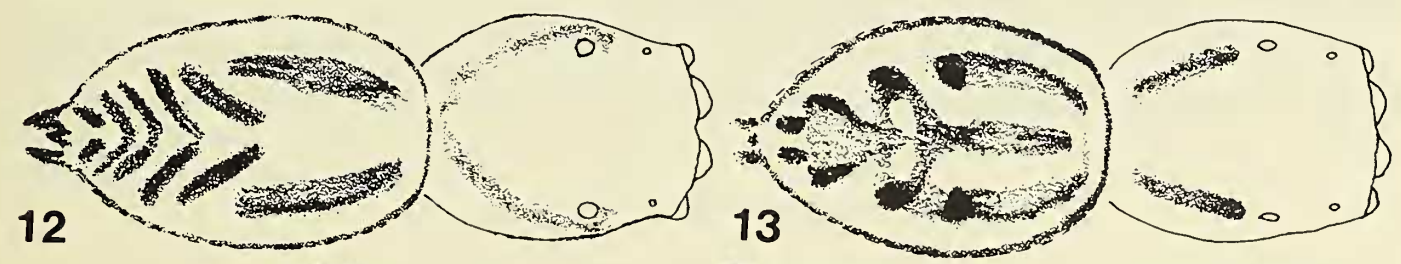
Figs. 7-11.—*Metaphidippus arizonensis* females: 7, Chevelon, dorsal view; 8, Chevelon, epigynum. 9-11. Variation in internal copulatory tubes. 9, Cedar Creek specimen; 10-11, Chevelon specimens. Scale in mm does not pertain to dorsal body view.

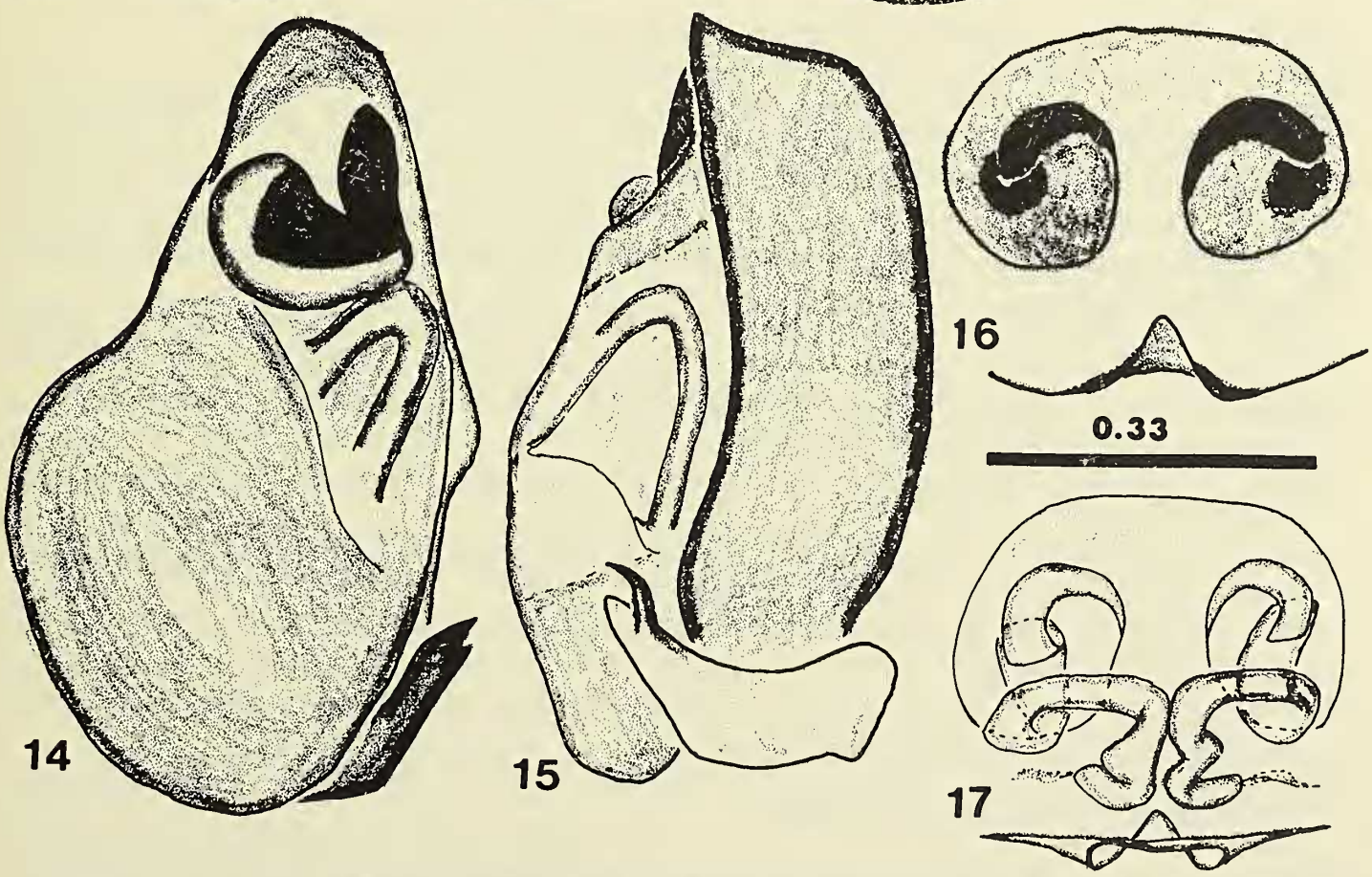
0.17, PME 0.07, PLE 0.15. Distance ALE-PME 0.18, PLE-PME 0.25. Femora lengths: I 1.20, II 1.00, III 0.99, IV 1.22. Leg order I, IV, II, III. Spination and color pattern as in male, see figure 13 for unfaded specimen. In eight female specimens measured: the width of eyerow III, mean 1.19, range 1.10-1.37; the length of right femur I, mean 1.15, range 1.00-1.25; the minimum width between the epigynal rims, mean 0.09, range 0.07-0.13.

Distribution.–Northern California, western North Dakota, southern Utah, north central Wyoming.

Material examined.–UNITED STATES: **California,** *Lassen Co.,* 13 mi S. of Ravendale, 5 June 1970, ex *Sesymbrium* (P. Rude), male (CB); *Marin Co.,* 4 mi N. of Novato, 10 April 1972, *Salicornia* marsh, Devac (E. Schlinger), male (CB); *San Francisco Co.,* San Francisco, 7 April 1918 (Helen van Duzee), male holotype, female paratype (CAS), San Francisco, 2 female paratypes (MCZ); **North Dakota;** *McKenzie Co.,* Theodore Roosevelt National Park, North Unit, 11 July 1970, sweeping herbs and shrubs in wooded gulley (K. V. Stone), female (FSCA); **Utah;** *Kane Co.,* Coral Pink Sand Dunes, near Kanab, 19 June 1974, on sagebrush with eggs in retreat (D. T. Jennings), female (BC); *Sevier Co.,* Richfield, 25 May 1930 (W. J. Gertsch), 2 females (AMNH); **Wyoming;** *Bighorn Co.,* 6 mi E. of Shell on Highway 14, sweeping grasses and shrubby bushes in area of low shrubby vegetation and many rocks (W. Maddison), male, 2 females (WM); Shell, 23 June 1965, saltbush (W. D. Fronk), male (BC).

The distribution of these two species overlaps in western North Dakota. *M. helenae* is found in interior basins and along the Pacific coast, whereas *M. arizonensis* is a grassland species found from the eastern edge of the tall grass prairie, through the short grass plains, and into mountain meadows. Undoubtedly both species will be found in more sites,





Figs. 12-17.–*Metaphidippus helenae:* 12, Male, Wyoming, dorsal view (California coastal specimens have the chevrons reduced, and the stripes extend to the posterior of the opisthosoma); 13, Female, Kane County, Utah, dorsal view (Dark spots may be less prominent in other specimens); 14, Male palpus, Wyoming, ventral view, 15, retrolateral view; 16, Female, Kane County, Utah, epigynum, 17, internal copulatory tubes. Scale in mm does not pertain to dorsal body views.

because the interior of the continent where they live is poorly collected relative to the eastern grassland fringes and the coastal and desert areas. They may have different habitat preferences, but this is not clearly established by the label data.

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